



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants: Ranta et al. Docket No: 36373-015 (new); B-26 (old)  
Serial Number: 09/970,071 Examiner: Saadat, Cameron  
Filing Date: October 3, 2001 Art Unit: 3714  
For: Methods and apparatus for simulating dental procedures ...

Declaration of Inventors under 37 C.F.R. §1.131

1. We, John Ranta of Princeton, MA, Walter A. Aviles of San Diego, CA, R. Bruce Donoff of Chestnut Hill, MA, and Linda P. Nelson of West Newton, MA, are co-inventors of the above patent application. Claims in this application are directed to methods and apparatuses for simulating dental procedures for training dental students.
2. The subject matter of the claims was completed by all of us, as shown by the Oath/Declaration submitted with the application as filed that was executed by all of us. See Exhibit A attached hereto, which is a copy of the executed Oath/Declaration. The conception and reduction to practice of the invention as described and claimed in the above application was completed prior to July 19, 2000.
3. As evidence, we attach hereto a Report of Invention that was submitted to Harvard University showing that we developed a realistic virtual reality dental simulator with a haptic interface, prior to July 19, 2000. See Exhibit B attached hereto, p. 1. The haptic interface provided sensorimotor feedback simulating structural reality of enamel, dentin, and pulp. Ibid. p. 1. A simulated drill permitted removal of simulated decay and cavity repair. Ibid. p. 1. The prototype simulator could simulate different dental tools virtually. Ibid. p. 3.
4. The prototype simulator involved development of: using haptic enhanced computer graphics to teach and learn dental techniques; dental trainer providing sensorimotor feedback; reusable virtual tooth for simulator; reusable normal and decayed visual and sensory renderings of enamel, dentin, and pulp; instrumentals including virtual amalgam packer and plugger, drill, and explorer; end and side cutting virtual burrs; courseware in form of acceptable basic cavity designs; and intellectual content for amalgam properties to simulate realistic practice. Ibid. pp. 2-3.
5. The prototype described in paragraphs 3 and 4 was invented in the United States through experiments performed by us or by technicians working under our direction, and was invented prior to July 19, 2000.

6. We hereby declare that all statements made herein of our own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements are made with knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title XVIII of the United States Code and that willful false statements may jeopardize the validity of this application for patent or any patent issuing thereon.

Dated: 4/15/2007

John F. Ranta

Signature: 

Walter A. Aviles

Dated: \_\_\_\_\_

Signature: \_\_\_\_\_

R. Bruce Donoff

Dated: \_\_\_\_\_

Signature: \_\_\_\_\_

Linda P. Nelson

Dated: \_\_\_\_\_

Signature: \_\_\_\_\_

6. We hereby declare that all statements made herein of our own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements are made with knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title XVIII of the United States Code and that willful false statements may jeopardize the validity of this application for patent or any patent issuing thereon.

John F. Ranta

Dated: \_\_\_\_\_

Signature: \_\_\_\_\_

Walter A. Aviles

Dated: \_\_\_\_\_

Signature: \_\_\_\_\_

R. Bruce Donoff

Dated: 4/13/07

Signature: R. Bruce Donoff

Linda P. Nelson

Dated: \_\_\_\_\_

Signature: \_\_\_\_\_

APR-20-2007 08:00  
04/20/2007 07:00

LAWSON & WEITZEN  
617-730-0478

617 439 3987  
CHB DEPTOFDENTISTRY

P.003/003  
PAGE 03/03

6. We hereby declare that all statements made herein of our own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements are made with knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title XVIII of the United States Code and that willful false statements may jeopardize the validity of this application for patent or any patent issuing thereon.

John F. Ranta

Dated: \_\_\_\_\_

Signature: \_\_\_\_\_

Walter A. Avilcs

Dated: \_\_\_\_\_

Signature: \_\_\_\_\_

R. Bruce Donoff

Dated: \_\_\_\_\_

Signature: \_\_\_\_\_

Dated: 4/19/07

Linda P. Nelson

Signature: 

## **Exhibit A**

Please type a plus sign (+) inside this box →

PTO/SB/01 (12-97)

Approved for use through 9/30/00. OMB 0651-0032

Patent and Trademark Office, U.S. DEPARTMENT OF COMMERCE

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**DECLARATION FOR UTILITY OR  
DESIGN  
PATENT APPLICATION  
(37 CFR 1.63)**

Declaration Submitted with Initial Filing       Declaration Submitted after Initial Filing (surcharge (37 CFR 1.16 (e)) required)

Attorney Docket Number

B-26

First Named Inventor

Ranta, John F.

**COMPLETE IF KNOWN**

Application Number

/

Filing Date

Group Art Unit

Examiner Name

As a below named inventor, I hereby declare that:

My residence, post office address, and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

**Methods and apparatus for simulating dental procedures and for training dental students**

the specification of which

(Title of the Invention)

is attached hereto

OR

was filed on (MM/DD/YYYY)  as United States Application Number or PCT International

Application Number  and was amended on (MM/DD/YYYY)  (if applicable)

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment specifically referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 1.56.

I hereby claim foreign priority benefits under 35 U.S.C. 119(a)-(d) or 365(b) of any foreign application(s) for patent or inventor's certificate, or 365(a) of any PCT international application which designated at least one country other than the United States of America, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate, or of any PCT international application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application Number(s)	Country	Foreign Filing Date (MM/DD/YYYY)	Priority Not Claimed	Certified Copy Attached?
			<input type="checkbox"/>	YES <input type="checkbox"/> NO <input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>

Additional foreign application numbers are listed on a supplemental priority data sheet PTO/SB/02B attached hereto.

I hereby claim the benefit under 35 U.S.C. 119(e) of any United States provisional application(s) listed below.

Application Number(s)	Filing Date (MM/DD/YYYY)	
60,237,453	October 3, 2001	<input type="checkbox"/> Additional provisional application numbers are listed on a supplemental priority data sheet PTO/SB/02B attached hereto

[Page 1 of 2]

Burden Hour Statement This form is estimated to take 0.4 hours to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Assistant Commissioner for Patents, Washington, DC 20231.

PTO/SB/02A (3-97)

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DECLARATION				ADDITIONAL INVENTOR(S) Supplemental Sheet			
				Page <u>1</u> of <u>1</u>			
Name of Additional Joint Inventor, if any:				<input type="checkbox"/> A petition has been filed for this unsigned inventor			
Given Name (first and middle [if any])				Family Name or Surname			
Walter A.				Aviles			
Inventor's Signature					/ OCT 01		Date
Residence: City	San Diego	State	CA	Country	USA	Citizenship	USA
Post Office Address	809 Moana Drive						
Post Office Address							
City	San Diego	State	CA	ZIP	92106	Country	USA
Name of Additional Joint Inventor, if any:				<input type="checkbox"/> A petition has been filed for this unsigned inventor			
Given Name (first and middle [if any])				Family Name or Surname			
R. Bruce				Donoff			
Inventor's Signature							Date
Residence: City	Chestnut Hill	State	MA	Country	USA	Citizenship	USA
Post Office Address	25 Alberta Road						
Post Office Address							
City	Chestnut Hill	State	MA	ZIP	02467	Country	USA
Name of Additional Joint Inventor, if any:				<input type="checkbox"/> A petition has been filed for this unsigned inventor			
Given Name (first and middle [if any])				Family Name or Surname			
Linda P.				Nelson			
Inventor's Signature							Date
Residence: City	West Newton	State	MA	Country	U.S.A.	Citizenship	U.S.A.
Post Office Address	65 Hillside Avenue						
Post Office Address							
City	West Newton	State	MA	ZIP	02465	Country	U.S.A.

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DECLARATION				ADDITIONAL INVENTOR(S) Supplemental Sheet Page 1 of 1			
Name of Additional Joint Inventor, if any:				<input type="checkbox"/> A petition has been filed for this unsigned inventor			
Given Name (first and middle [if any])				Family Name or Surname			
Walter A.				Aviles			
Inventor's Signature					Date		
Residence: City	San Diego	State	CA	Country	USA	Citizenship	USA
Post Office Address	809 Moana Drive						
Post Office Address							
City	San Diego	State	CA	ZIP	92106	Country	USA
Name of Additional Joint Inventor, if any:	<input type="checkbox"/> A petition has been filed for this unsigned inventor						
Given Name (first and middle [if any])				Family Name or Surname			
R. Bruce				Donoff			
Inventor's Signature	<i>R. Bruce Donoff</i>				10/4/01		
Residence: City	Chestnut Hill	State	MA	Country	USA	Citizenship	USA
Post Office Address	25 Alberta Road						
Post Office Address							
City	Chestnut Hill	State	MA	ZIP	02467	Country	USA
Name of Additional Joint Inventor, if any:	<input type="checkbox"/> A petition has been filed for this unsigned inventor						
Given Name (first and middle [if any])				Family Name or Surname			
Linda P.				Nelson			
Inventor's Signature					Date		
Residence: City	West Newton	State	MA	Country	U.S.A.	Citizenship	U.S.A.
Post Office Address	65 Hillside Avenue						
Post Office Address							
City	West Newton	State	MA	ZIP	02465	Country	U.S.A.

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Please type a plus sign (+) inside this box → PTO/SB/02A (3-97)  
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DECLARATION				ADDITIONAL INVENTOR(S) Supplemental Sheet			
				Page <u>1</u> of <u>1</u>			
Name of Additional Joint Inventor, if any:				<input type="checkbox"/> A petition has been filed for this unsigned inventor			
Given Name (first and middle [if any])				Family Name or Surname			
Walter A.				Aviles			
Inventor's Signature					Date		
Residence: City	San Diego	State	CA	Country	USA	Citizenship	USA
Post Office Address	809 Moana Drive						
Post Office Address							
City	San Diego	State	CA	ZIP	92106	Country	USA
Name of Additional Joint Inventor, if any:				<input type="checkbox"/> A petition has been filed for this unsigned inventor			
Given Name (first and middle [if any])				Family Name or Surname			
Bruce R.				Donoff			
Inventor's Signature					Date		
Residence: City	Chestnut Hill	State	MA	Country	USA	Citizenship	USA
Post Office Address	25 Alberta Road						
Post Office Address							
City	Chestnut Hill	State	MA	ZIP	02467	Country	USA
Name of Additional Joint Inventor, if any:				<input type="checkbox"/> A petition has been filed for this unsigned inventor			
Given Name (first and middle [if any])				Family Name or Surname			
Linda P.				Nelson			
Inventor's Signature	<i>Linda P. Nelson</i>				Date	10/1/01	
Residence: City	West Newton	State	MA	Country	U.S.A.	Citizenship	U.S.A.
Post Office Address	65 Hillside Avenue						
Post Office Address							
City	West Newton	State	MA	ZIP	02465	Country	U.S.A.

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**DECLARATION FOR UTILITY OR  
DESIGN  
PATENT APPLICATION  
(37 CFR 1.63)**

Declaration Submitted with Initial Filing      OR       Declaration Submitted after Initial Filing (surcharge (37 CFR 1.16 (e)) required)

Attorney Docket Number	B-26
First Named Inventor	Ranta, John F.
<b>COMPLETE IF KNOWN</b>	
Application Number	09 / 970,071
Filing Date	10/03/2001
Group Art Unit	3713
Examiner Name	Unassigned

As a below named inventor, I hereby declare that:

My residence, post office address, and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

Methods and apparatus for simulating dental procedures and for training dental students

the specification of which  
 is attached hereto      *(Title of the Invention)*  
OR  
 was filed on (MM/DD/YYYY)  as United States Application Number or PCT International

Application Number  and was amended on (MM/DD/YYYY)  (if applicable).

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment specifically referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 1.56.

I hereby claim foreign priority benefits under 35 U.S.C. 119(a)-(d) or 365(b) of any foreign application(s) for patent or inventor's certificate, or 365(a) of any PCT international application which designated at least one country other than the United States of America, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate, or any PCT international application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application Number(s)	Country	Foreign Filing Date (MM/DD/YYYY)	Priority Not Claimed	Certified Copy Attached?
			<input type="checkbox"/>	<input type="checkbox"/> YES <input type="checkbox"/> NO
			<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>

Additional foreign application numbers are listed on a supplemental priority data sheet PTO/SB/02B attached hereto.

I hereby claim the benefit under 35 U.S.C. 119(e) of any United States provisional application(s) listed below.

Application Number(s)	Filing Date (MM/DD/YYYY)	<input type="checkbox"/> Additional provisional application numbers are listed on a supplemental priority data sheet PTO/SB/02B attached hereto.
60,237,453	October 3, 2001	<input type="checkbox"/>

[Page 1 of 2]

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**DECLARATION — Utility or Design Patent Application**

I hereby claim the benefit under 35 U.S.C. 120 of any United States application(s), or 365(c) of any PCT international application designating the United States of America, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT international application in the manner provided by the first paragraph of 35 U.S.C. 112, I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application.

U.S. Parent Application or PCT Parent Number	Parent Filing Date (MM/DD/YYYY)	Parent Patent Number (if applicable)

Additional U.S. or PCT international application numbers are listed on a supplemental priority data sheet PTO/SB/02B attached hereto.  
As a named inventor, I hereby appoint the following registered practitioner(s) to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith:  Customer Number  →  Place Customer Number Bar Code Label here  
 Registered practitioner(s) name/registration number listed below

Name	Registration Number	Name	Registration Number

Additional registered practitioner(s) named on supplemental Registered Practitioner Information sheet PTO/SB/02C attached hereto.  
Direct all correspondence to:  Customer Number or Bar Code Label  OR  Correspondence address below

Name	Charles G. Call		
Address	Patent Attorney		
Address	53 Saint Stephen Street		
City	Boston	State	MA
Country	U.S.A.	Telephone	(617) 266-2925
		Fax	(508) 629-6540

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. 1001 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Name of Sole or First Inventor:	<input type="checkbox"/> A petition has been filed for this unsigned inventor							
Given Name (first and middle if any)				Family Name or Surname				
John F.				Ranta				
Inventor's Signature								
Residence: City	Princeton	State	MA	Country	U.S.A.	Citizenship	USA	
Post Office Address	62 Rhodes Road							
Post Office Address								
City	Princeton	State	MA	ZIP	01541	Country	U.S.A.	

Additional inventors are being named on the 1 supplemental Additional Inventor(s) sheet(s) PTO/SB/02A attached hereto

## **Exhibit B**

Harvard Medical School/Harvard School of Dental Medicine  
Report of Invention  
Case Number: 1755-00

Title of Invention: Three dimensional, haptic enabled dental simulator

Investigator(s): Name University Address Telephone

1. R. Bruce Donoff 188 Longwood Avenue, Boston, MA 02115 (617) 432-1401

2. Linda Nelson 188 Longwood Avenue, Boston, MA 02115 (617) 432-2690

3.

Grants, Gifts or Contracts Which Supported The Work Leading To This Invention: (Include  
Private, Federal and Non-Federal)

Sponsor	Award Number	Time Period
---------	--------------	-------------

1. \_\_\_\_\_  
2. \_\_\_\_\_  
3. \_\_\_\_\_

Lab or Department Where Developed: Harvard School of Dental Medicine

Description of Invention (please type or print clearly):

1. Brief Summary (add any extra pages or drawings, if needed, as well as any relevant manuscripts or articles if available)

Working with Teneo Computing, Inc., HSDM has developed a realistic virtual reality dental simulator. A haptic interface adds sensorimotor feedback simulating structural reality of enamel, dentin and pulp. A simulated drill permits removal of decay and cavity repair. This prototype simulator required development of:

1. Concept of using haptic enhanced computer graphics to teach and learn dental techniques;
2. Dental trainer providing sensorimotor feedback;
3. Reusable virtual tooth for simulator;
4. Reusable normal and decayed visual and sensory renderings of enamel, dentin and pulp;
5. Instrumentals including virtual amalgam packer and plugger, drill, and explorer;
6. End and side cutting virtual burrs;
7. Courseware in form of acceptable basic cavity designs;

8. Intellectual content for amalgam properties to simulate realistic practice;
9. Plans to continue validation and continuing feedback on technological implementation of practice;
10. Courseware in properties and manipulation of restorative materials.

2. Background including specific literature citations if available

3. Expected future uses and/or commercial applications (please list as many applications as you feel are feasible):

1. Use of virtual trainer to replace manikin teaching;
2. Extension and validation of prototypical examples into a commercial Virtual Reality Dental Training System (VRDTS);
3. Use in dental schools for basic teaching;
4. Use in continuing education e.g. implant training;
5. Use in distance web learning.

4. First Written Disclosure: Date: \_\_\_\_\_  
Form of disclosure (journal article, thesis, oral presentation, etc.):

5. First Reduction to Practice: Date: \_\_\_\_\_  
Location:

6. List Any Agreements including MTA's and ISRA's With Commercial Organizations Relating to this Invention (Include name of person contacted):

7.

Inventor(s)

Witness (Disclosed to, and understood by, me.)

\_\_\_\_\_  
Signature)

\_\_\_\_\_  
Signature)

\_\_\_\_\_  
Signature)

\_\_\_\_\_  
Signature)

**Dental Instruments** (most of these are double-ended so 2 represents one double ended instrument)

Explorer 2  
Drill/Handpiece (there are actually two of these: high and low speed)  
Excavator 4  
Gingival Margin Trimmer 4  
Hatchet 4  
Chisel 2  
Amalgam plugger 6  
Burnisher 1  
Hoe 2  
Plastic Instrument 2  
Cleiod discoid 4  
Anatomical burnisher 2  
Amalgam Carrier 2  
Dycal Applicator 2  
Cotton Pliers  
Interproximal carver 2  
Tofflemire retainer

**Burs**

High Speed

330

245

700

1/2

34

56

169L

Low speed

1/2

1/4

2

4

6

There are also composite finishing burs. There are diamond burs used for the crown and bridge and veneer preps

**Other materials**

matrix bands for Class II amalgams

wooden wedges for Class II amalgams

micro brushes for composite

articulating paper to check occlusion of the restoration with opposing teeth

shade guide for composite

APR-04-2007 16:52  
04/04/2007 16:45

LAWSON & WEITZEN  
6174959568

HARVARD OTD

617 439 3987

P.005/005  
PAGE 05/05

polishing disks and mandrel for composite

TOTAL P.005

## **Appendix B**

7004 07500 00000 5338 2279

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Certified Fee	\$ 2.65
Return Receipt Fee (Endorsement Required)	\$ 2.15
Restricted Delivery Fee (Endorsement Required)	\$ 0.00
Total Postage & Fees	\$ 5.77

Sent To: **Walter Ariles, Ph.D.**  
 Street, Apt. No.: **809**  
 or PO Box No. **Moana Dr.**  
 City, State, ZIP+4 **San Diego, CA 9210**  
 PS Form 3800; June 2002. See Reverse for Instructions.

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 4/1/2007  
 05/19/2007  
 05/19/2007  
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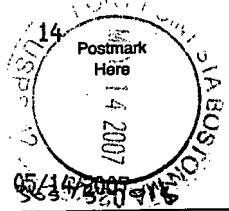
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## **Appendix C**

2262  
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Postage	\$ 0.58
Certified Fee	\$2.65
Return Receipt Fee (Endorsement Required)	\$2.15
Restricted Delivery Fee (Endorsement Required)	\$0.00
Total Postage & Fees	\$ 5.38
0109	
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<b>Sent To</b> Walter Aviles, Ph.D. <b>Street, Apt. No.</b> Movint Technologies, Inc. <b>or PO Box No.</b> 4109 Bexar Ave. NW <b>City, State, ZIP+4</b> Albuquerque, NM 87114	
PS Form 3800, June 2002.	
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Status: Delivered

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ALBUQUERQUE, NM 87114.

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## Appendix D

## Schoen, Adam

---

**From:** Schoen, Adam  
**Sent:** Thursday, April 12, 2007 4:57 PM  
**To:** 'johnranta@yahoo.com'; 'bruce\_donoff@hsdm.harvard.edu'; 'linda\_nelson@hsdm.harvard.edu'; 'aviles@novint.com'  
**Cc:** Guterman, Sonia; Schoen, Adam; 'katherine\_gordon@hms.harvard.edu'  
**Subject:** Patent application for: Methods and apparatus for simulating dental procedures (HU#1755); our ref.: 36373-015

Dear John, Bruce, Linda, and Aviles

Sonia and I would like to take a moment to introduce ourselves. We are patent attorneys in Boston, MA and will be continuing the prosecution of the above patent application.

The above application has been rejected in view of a paper presented at the International Conference on Information Visualization in 2000. We believe that this rejection can be overcome by a procedure known as "swearing behind". Accordingly, we have prepared a Declaration for all of you to sign, to swear to inventing the subject matter of the current application prior to the publication the 2000 paper.

Dr. Gordon has asked us to send this Declaration to you for your signature. Please print, sign, and return to us the attached Declaration. We need to have your signed copies by April 18, 2007, so we can submit them with our Response, which is due April 20, 2007. The signed document can be returned to us by facsimile using the facsimile number below or as a PDF file and emailed back to us at the email address below.

Best regards

Sonia and Adam



37 CFR 1.131

Declaration of in...

Adam Schoen, Associate  
Sonia Guterman, Partner  
Lawson & Weitzen, LLP  
88 Black Falcon Avenue, Ste. 345  
Boston, MA 02210-2414  
Telephone: 617-439-4990  
Direct Line: 617-603-3744  
Fax: 617-439-3987  
email: aschoen@lawson-weitzen.com

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## **Appendix E**

## Schoen, Adam

---

**From:** Schoen, Adam  
**Sent:** Wednesday, April 25, 2007 4:59 PM  
**To:** 'aviles@novint.com'  
**Cc:** Guterman, Sonia; Schoen, Adam; 'katherine\_gordon@hms.harvard.edu'; 'anne\_craig@harvard.edu'  
**Subject:** Patent application for: Methods and apparatus for simulating dental procedures (HU#1755); our ref.: 36373-015

Dear Dr. Aviles

Sonia and I would like to take a moment to introduce ourselves. We are patent attorneys in Boston, MA who do a large amount of work for Harvard University and Harvard Medical School, and will be continuing the prosecution of the above patent application.

The above application has been rejected in view of a paper presented at the International Conference on Information Visualization in 2000. We believe that this rejection can be overcome by a procedure known as "swearing behind". Accordingly, we have prepared a Declaration for the four co-inventors to sign, to swear to inventing the subject matter of the current application prior to the publication the 2000 paper.

Dr. Gordon has asked us to send this Declaration to you for your signature. Please print, sign, and return to us the attached Declaration. The three other co-inventors have already signed and returned their copy of the Declaration to us. We need to have your signed copy by May 10, 2007, so we can submit the four Declarations with our Response, which is due May 20, 2007. The signed document can be returned to us by facsimile using the facsimile number below or as a PDF file and emailed back to us at the email address below.

Please confirm receipt of this email.

Best regards

Sonia and Adam



37 CFR 1.131  
Declaration of in...

Adam Schoen, Associate  
Sonia Guterman, Partner  
Lawson & Weitzen, LLP  
88 Black Falcon Avenue, Ste. 345  
Boston, MA 02210-2414  
Telephone: 617-439-4990  
Direct Line: 617-603-3744  
Fax: 617-439-3987  
email: aschoen@lawson-weitzen.com

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## **Appendix F**

**Schoen, Adam**

---

**From:** Gordon, Katherine [katherine\_gordon@hms.harvard.edu]  
**Sent:** Thursday, May 03, 2007 6:47 AM  
**To:** Guterman, Sonia  
**Cc:** Schoen, Adam  
**Subject:** RE: w aviles

Hi

Bruce sent him an email yesterday afternoon. If he doesn't respond in a day or so I'll ask him to make a phonecall. If you get the signed declaration, please let me know so I can stop bugging Bruce.

Meanwhile is there a contingency plan for 3/4 inventors?

## **Appendix G**

## Schoen, Adam

---

**From:** Marvin Maslow [maslow@ix.netcom.com]  
**Sent:** Wednesday, May 09, 2007 3:41 PM  
**To:** Guterman, Sonia  
**Subject:** Re: email contact and identity verification

Please write to: aviles@novint.com

Thanks,

=Marv=

Sent from my Verizon Wireless BlackBerry  
Marvin Maslow  
Cell Phone  
(917) 923-3300

-----Original Message-----

From: "Guterman, Sonia" <sguterman@lawson-weitzen.com>  
Date: Wed, 9 May 2007 15:27:04  
To:<maslow@ix.netcom.com>  
Cc:"Schoen, Adam" <aschoen@lawson-weitzen.com>  
Subject: email contact and identity verification

Dear Dr. Maslow,

This email verifies my identity as a patent attorney, in hopes of getting contact info for Dr. Walter Aviles.

Thank you in advance for help.

Sonia

Sonia K. Guterman, Ph.D., J.D.  
Partner  
Lawson & Weitzen, LLP  
88 Black Falcon Avenue, Ste. 345  
Boston, MA 02210-2414  
Telephone: 617-439-4990  
Direct Line: 617-603-3770  
Fax: 617-439-3987

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## Appendix H

## Schoen, Adam

---

**From:** Schoen, Adam  
**Sent:** Wednesday, May 09, 2007 3:59 PM  
**To:** 'aviles@novint.com'  
**Cc:** Guterman, Sonia; Schoen, Adam; 'katherine\_gordon@hms.harvard.edu'; 'bruce\_donoff@hsdm.harvard.edu'; 'maslow@ix.netcom.com'  
**Subject:** Patent application for: Methods and apparatus for simulating dental procedures (HU#1755); our ref.: 36373-015

Dear Dr. Aviles

All previous attempts to contact you by phone or email have failed, so we have no idea whether these are systems failures or you are not interested in responding. We have attempted to obtain a telephone number for you from Novint but to no avail.

Dr. Gordon of Harvard University has asked us to send this Declaration to you for your signature. All of the other inventors have signed, and the absence of a signed copy from you makes us have to initiate a much more expensive procedure. There is no possible harm that can come to you from signing, however the cost of the more expensive procedure will be subtracted from any revenues that this may possibly generate for you and other inventors.

We see no reason why you are not interested in helping out the progress of this Harvard Med invention, as regardless of what the future holds for you, there is no reason that you should cast aside Harvard as a friend. Further, as you remain involved in high tech, you should want any patent application of which you are an inventor to issue as a patent, as efficiently and economically as possible.

Please print, sign, and return to us the attached Declaration. We need to have your signed copy by May 15, 2007, so we can submit the four Declarations with our Response, which is due May 20, 2007. The signed document can be returned to us by facsimile using the facsimile number below or as a PDF file and emailed back to us at the email address below.

Please confirm receipt of this email.

Best regards

Sonia and Adam



37 CFR 1.131  
Declaration of in...

Adam Schoen, Associate  
Sonia Guterman, Partner  
Lawson & Weitzen, LLP  
88 Black Falcon Avenue, Ste. 345  
Boston, MA 02210-2414  
Telephone: 617-439-4990  
Direct Line: 617-603-3744  
Fax: 617-439-3987  
email: aschoen@lawson-weitzen.com

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## **Appendix I**

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants: Ranta et al. Docket No: 36373-015 (new); B-26 (old)  
Serial Number: 09/970,071 Examiner: Saadat, Cameron  
Filing Date: October 3, 2001 Art Unit: 3714  
For: Methods and apparatus for simulating dental procedures ...

Declaration of Assignee under 37 C.F.R. §1.131

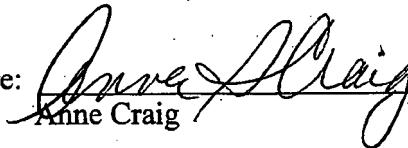
1. The subject matter of the claims was completed by the four inventors and assigned to President and Fellows of Harvard College. See Exhibit A attached hereto, which is a printout from the U.S. Patent and Trademark Office Assignment Database showing assignment of the rights in the invention corresponding to the above serial number to President and Fellows of Harvard College.
2. Harvard University has a computer records database in which Reports of Invention are kept in the course of regularly conducted business activities. It is the regular practice of Harvard University to request that such Reports be made by inventors and to enter and docket such Reports into the computer database as of the date received from the inventors. Attach hereto is a Report of Invention that was submitted by the inventors of the above application to Harvard University and entered into the computer database. See Exhibit B attached hereto. The computer database shows that the Report of Invention was made of record in the database prior to July 19, 2000.
3. The report shows that the inventors developed a realistic virtual reality dental simulator with a haptic interface, which Report was entered into the computer database prior to July 19, 2000. See Exhibit B attached hereto, p. 1. The haptic interface provided sensorimotor feedback simulating structural reality of enamel, dentin, and pulp. Ibid. p. 1. A simulated drill permitted removal of simulated decay and cavity repair. Ibid. p. 1. The prototype simulator could simulate different dental tools virtually. Ibid. p. 3.
4. The prototype simulator involved development of: using haptic enhanced computer graphics to teach and learn dental techniques; dental trainer providing sensorimotor feedback; reusable virtual tooth for simulator; reusable normal and decayed visual and sensory renderings of enamel, dentin, and pulp; instrumentals including virtual amalgam packer and plugger, drill, and explorer; end and side cutting virtual burrs; courseware in form of acceptable basic cavity designs; and intellectual content for amalgam properties to simulate realistic practice. Ibid. pp. 2-3.

5. I hereby declare that all statements made herein of our own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements are made with knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title XVIII of the United States Code and that willful false statements may jeopardize the validity of this application for patent or any patent issuing thereon.

President and Fellows of Harvard College  
Assignee of entire interest

Dated: 5/18/07

Signature:

  
Anne Craig

**Anne Craig  
Director of Intellectual Property  
Office of Technology Development  
Harvard University**

## **Exhibit A**



## United States Patent and Trademark Office

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## Assignments on the Web &gt; Patent Query

## Patent Assignment Details

**NOTE: Results display only for issued patents and published applications. For pending or abandoned applications please consult USPTO staff.**

Reel/Frame: 018644/0359

Pages: 6

Recorded: 12/15/2006

Conveyance: ASSIGNMENT OF ASSIGNORS INTEREST (SEE DOCUMENT FOR DETAILS).

## Total properties: 1

1	Patent #: NONE	Issue Dt:	Application #: 09970071	Filing Dt: 10/03/2001
	Publication #: <a href="#">US20020119432</a>	Pub Dt: 08/29/2002		

Title: Methods and apparatus for simulating dental procedures and for training dental students

## Assignors

1	<a href="#">RANTA, JOHN F.</a>	Exec Dt: 12/02/2006
2	<a href="#">AVILES, WALTER A.</a>	Exec Dt: 10/01/2001
3	<a href="#">NELSON, LINDA P.</a>	Exec Dt: 10/01/2001
4	<a href="#">DONOFF, R. BRUCE</a>	Exec Dt: 10/01/2001

## Assignee

1	<a href="#">PRESIDENT AND FELLOWS OF HARVARD COLLEGE</a>
	17 QUINCY STREET
	CAMBRIDGE, MASSACHUSETTS 02138

## Correspondence name and address

CHARLES G. CALL  
68 HORSE POND RD  
WEST YARMOUTH, MA 02673-2516

Search Results as of: 05/15/2007 09:00 AM

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Web interface last modified: April 20, 2007 v.2.0.1

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**Exhibit B**

Harvard Medical School/Harvard School of Dental Medicine  
Report of Invention Case Number: 1755-00

Title of Invention: Three dimensional, haptic enabled dental simulator

Investigator(s): Name	University Address	Telephone
1. R. Bruce Donoff	188 Longwood Avenue, Boston, MA 02115	(617) 432-1401
2. Linda Nelson	188 Longwood Avenue, Boston, MA 02115	(617) 432-2690
3.		

Grants, Gifts or Contracts Which Supported The Work Leading To This Invention: (Include  
Private, Federal and Non-Federal)

Sponsor	Award Number	Time Period
1.		
2.		
3.		

Lab or Department Where Developed: Harvard School of Dental Medicine

Description of Invention (please type or print clearly):

1. Brief Summary (add any extra pages or drawings, if needed, as well as any relevant manuscripts or articles if available)

Working with Teneo Computing, Inc., HSDM has developed a realistic virtual reality dental simulator. A haptic interface adds sensorimotor feedback simulating structural reality of enamel, dentin and pulp. A simulated drill permits removal of decay and cavity repair. This prototype simulator required development of:

1. Concept of using haptic enhanced computer graphics to teach and learn dental techniques;
2. Dental trainer providing sensorimotor feedback;
3. Reusable virtual tooth for simulator;
4. Reusable normal and decayed visual and sensory renderings of enamel, dentin and pulp;
5. Instrumentals including virtual amalgam packer and plugger, drill, and explorer;
6. End and side cutting virtual burrs;
7. Courseware in form of acceptable basic cavity designs;

8. Intellectual content for amalgam properties to simulate realistic practice;
9. Plans to continue validation and continuing feedback on technological implementation of practice;
10. Courseware in properties and manipulation of restorative materials.

2. Background including specific literature citations if available

3. Expected future uses and/or commercial applications (please list as many applications as you feel are feasible):

1. Use of virtual trainer to replace manikin teaching;
2. Extension and validation of prototypical examples into a commercial Virtual Reality Dental Training System (VRDTS);
3. Use in dental schools for basic teaching;
4. Use in continuing education e.g. implant training;
5. Use in distance web learning.

4. First Written Disclosure: Date: \_\_\_\_\_  
Form of disclosure (journal article, thesis, oral presentation, etc.):

5. First Reduction to Practice: Date: \_\_\_\_\_  
Location:

6. List Any Agreements including MTA's and ISRA's With Commercial Organizations Relating to this Invention (Include name of person contacted):

7.

Inventor(s)

\_\_\_\_\_  
Signature)

\_\_\_\_\_  
Signature)

\_\_\_\_\_  
Signature)

Witness (Disclosed to, and understood by, me.)

\_\_\_\_\_  
Signature)

**Dental Instruments** (most of these are double-ended so 2 represents one double ended instrument)

Explorer 2

Drill/Handpiece (there are actually two of these: high and low speed)

Excavator 4

Gingival Margin Trimmer 4

Hatchet 4

Chisel 2

Amalgam plunger 6

Burnisher 1

Hoe 2

Plastic Instrument 2

Cleiod discoid 4

Anatomical burnisher 2

Amalgam Carrier 2

Dycal Applicator 2

Cotton Pliers

Interproximal carver 2

Tofflemire retainer

**Burs**

High Speed

330

245

700

1/2

34

56

169L

Low speed

1/2

1/4

2

4

6

There are also composite finishing burs. There are diamond burs used for the crown and bridge and veneer preps

**Other materials**

matrix bands for Class II amalgams

wooden wedges for Class II amalgams

micro brushes for composite

articulating paper to check occlusion of the restoration with opposing teeth

shade guide for composite

APR-04-2007 16:52  
04/04/2007 16:45

LAWSON & WEITZEN  
6174959568

HARVARD OTD

617 439 3987 P.005/005  
PAGE 05/05

polishing disks and mandrel for composite

TOTAL P.005